

REMARKS
ON
OBESITY.

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OBESITY is a disease, when going on to a fatal termination, that is very seldom met with even by those engaged in very extensive practice; and as regards the medicinal treatment of such cases, most agents seem inoperative, beyond the mere exhibition of those remedies which increase the flow of the natural excretions, and by keeping up a constant drain upon the system, thus those particles are carried off which might, if retained, be converted into fat: but as we know that the deposition of fat, in these instances, is not in a relative proportion to the consumed ingesta, and chiefly dependent upon perversion in the assimilative process; or, as some pathologists have affirmed, that the disease originates first in the blood itself; the question rather merits an investigation into its fundamental causes, with a view, if possible, to successfully combat such causes, than to be regarded merely as a curious specimen of disease. The rapid advances of chemical pathology which have of late thrown great light upon what were previously considered questions involved in impenetrable mystery, have developed facts so manifest, as to now lie beyond the point of disputation: and whatever reflections the self-styled practical man may make on the investigated truths of those who would rear the superstructure of rational medicine upon the basis of philosophic deduction, it is too abundantly evident to be more than insisted upon here, that the above-named and other branches of professional knowledge have supplied us, in the treatment of these kind of affections, with principles easily reducible to practical bearing,—without which the exercise of the art becomes mere empiricism, founded upon crude reasonings and vague speculations.

In many persons there is a considerable inclination to corpulency, which, when not excessive, is accounted as an indication of robust health,—as the result of an active vascular system, and a condition of the blood highly replete with those materials from which the various tissues are elaborated, than as evidence of morbid change: therefore health and great

increase of adipose matter may coexist, and are not incompatible. All carnoeaus, oleaginous, and farinaceous aliments favour corpulency, as from such the elements entering into the constitution of fat are plentifully elicited. In the normal state, when the body has acquired its proper standard of height, and has expanded to the adult dimensions, health, so called, is when there is a corresponding relation between the two great processes of decay and renovation,—processes which, from the first embryotic commencement of the new being, to the latest moment of its existence, are continually going on, modified, however, by certain laws infallibly operating in the animal economy, as well as by numerous extrinsic influences that importantly bear upon these changes. When renovation becomes excessive, hypertrophy, partial or general, is the consequence;* and late writers have gone so far as to maintain that even inflammation in a part is nothing more than an excess of nutrition to such part, and that the sequent train of phenomena are referable to such cause.† General hypertrophy always manifests itself by the deposition of fat, and if to a great degree, by the conversion of various tissues into that substance; and all by being surcharged with it, the filamentous and muscular, are, after the adipose (which is a tissue peculiar to fat), most liable to assume the diseased mutation. The localities where the chief depositions are found in the obese, are in the subcutaneous cellular tissue, the omentum, the filamentous structure around the kidneys, mediastinum, mesentery, and the interstices of the muscles. The pericardium and appendices epiploicae may also be instanced. When obesity is partial, the omentum beneath the chin, the mammae in women, and sometimes the nates, as in

* The common fatty tumor is but a *partial obesity*, and in those cases where the omentum in particular becomes so enlarged with fat as to give rise to what is vulgarly termed the "pot belly," is another instance of partial abnormal deposition of fat. Some of the encysted tumors, particularly the atheromatous and steatomatous, might also be considered as somewhat of the same radical nature.

† Professor Bennett, of Edinburgh, and others.

the Bosjesmian Hottentots which many travellers have not omitted to describe. There is a race of sheep at the Cape of Good Hope, in the bodies of which partial obesity is so considerably developed in their hind quarters, as to quite destroy the animal's symmetry.

Obesity is not confined to any particular period of life, as infants as well as adults labour under the affection; and illustrations are in medical literature supplied, where at birth the obese tendency was evident, and which gradually afterwards progressed to extraordinary magnitudes. Mr. Wadd, who is quoted by most writers on this subject, has given many instances corroborative of what is now asserted. Mary Tate (says Mr. Wadd) was the daughter of an inn-keeper at Cambridge, and at 12 years weighed 13 stone! Isaac Butterfield, born near Leeds, when not 2 years old weighed one hundred-weight! I may here give the particulars of an extraordinary case which I personally examined a few weeks ago, in the instance of a child which has been for some months past publicly exhibited in various parts of London, and called the "Infant Goliath." William Fields was born at Manchester in October, 1845. At birth he had three teeth, and when thirteen months old he had twenty-six teeth. He is of particularly mild and amiable disposition, scarcely ever being fretful and uneasy, as generally noticed in children of his time of life. Has light hair, blue eyes, and is of fair complexion. Around the shoulders he measured thirty-nine and a half inches; round the body, thirty-six and a half inches; round the knee, sixteen and a quarter inches; at calf of leg, fourteen and three-quarters; at ankles, seven and a half; at upper arm, fourteen and three-quarters; and below elbow, eleven and a half inches: weighed then (Nov. 1848), being but three years and a month old, 124 pounds! One of his relatives, his father informed me, weighed 35 stone, 12 lbs. He is as tall as most boys at six years of age. The skin is soft and smooth to the touch, and, when pressed upon, imparted to the fingers that elastic springy feel so characteristic of fatty formations. The subcutaneous accumulation hangs in pendulous annular folds on the limbs, and at the lateral aspects of the body bags down in shapeless masses. The

penis and scrotum I particularly examined, as well as Mr. Prout Girdwood, who accompanied me to inspect this strange specimen of obese disease, and it was found that the genital organs were not larger than in children of the same age. No testes could be felt, and the scrotum contained nothing but two thin cord-like substances, of not more than from one to two lines in thickness. The father stated that both Sir Charles Clark and Dr. Locock had previously examined the genital organs, and that they were normal; but those physicians could not have made more than a visual inspection, as there certainly were no testes detectable by manipulation. His appetite was very large, and he passed the major part of his time in eating and sleeping. After numerous questions were put, it was conclusive there was no precocity of intellect, and his deportment and answers were quite in accordance with such as might have been expected in children of his age.*

It appears to have been one of the many wise provisions of Nature that all young animals should be endowed with a considerable amount of fat, thereby supplying an abundance of those materials so essentially necessary in the generation of animal heat; and, were it otherwise, young creatures would be liable to perish from a gradual declension of vital power consequent upon a deficient amount of animal heat, without which all tribes of warm-blooded animals could not exist. M. Chossat's† experiments on this point

* In eunuchs, the castration and spaying of animals, there is abundant proof how the removal of the testes and ovaria favour corpulency, and that by their loss the body loses its fine proportions. A case may here be cited where there was congenital deficiency of the testes in an individual whom I have long known. From infancy he was fat, and became more unshapely as he became older. He is between twenty and thirty years of age, and a monstrosity in appearance, from obesity and unsymmetrical development. This person is below the middle stature; has no whiskers or beard, small sunken eyes, squeaking voice, effeminate hands, the scrotum and penis remarkably small, and without any hair on the pubis. His figure is unwieldy and disproportionate. The inferior extremities are thrown forward in the gait, and the limbs have lost their proper shape. The skin is soft and velvety, and those inter-muscular lines so natural to the male conformation are lost in a smooth and even plumpness. There are cases on record, where the testes, from accident or operation, have been lost, where a change to the above-described conditions have gradually supervened, proving indisputably how these organs influence the entire system.

† *Recherches Experimentales sur l'Inanition.*
Paris, 1843.

have unequivocally attested the fact. It was found, when birds were deprived of food, that a diminution of temperature in their bodies resulted; and this fall of the thermometer was in a precise ratio with the increase of inanition. In some of these experiments, where the inanitized state was carried so far as to induce death, the thermometer fell on the last day to 25° Fah., whereas on the earlier days of the inanitized state the reduction of temperature was not more than three or four degrees. On examining the various organs after death, more than 90 per cent. of fat had been absorbed; and those animals which at the commencement of the experiments had the greatest amount of fat, lived the longest. When artificial heat was applied before death, the animal was for a time somewhat revivified, and the torpor immediately returned as soon as the artificial heat was withdrawn. From these investigations into the laws of animal heat, M. Chossat had incontrovertibly shown that fat is really the fuel from which the calorific agent is obtained; that any continuous existence is incompatible with the entire loss of it; and that, of all the solids of the body, it is by far the most quickly consumed; that, where the protein compound is not supplied for nutrition, life can for a time be sustained by the absorption of this material existing in the body itself. It might also have been mentioned that M. Chossat found the nervous tissue scarcely in any degree below its normal weight, whilst every other tissue had undergone considerable diminution; from which it might appear that the nervous tissue and the healthy maintenance of the nervous centres were intimately dependent upon the fat of the body, and not, as other organs, upon the protein-compound: hence we have a theoretical explanation why individuals of active brains and great nervous irritability are seldom fat, because the increased exercise of any organ evolves an increased quantity of effete molecular particles, and increase of waste demands a commensurate augmentation of renovating materials; therefore, if the materials which go to nourish the great nervous centres are mainly educted from the fat, leaness and an active nervous system stand in intimate relation to each

other. Animals inhabiting the arctic regions have a far greater adipose development than those which are natives of the tropics; because in those cold regions it is required that more carbon and hydrogen should be *burnt* for the keeping up of the respiratory function. An Esquimaux or a Greenlander could not bear the rigorous cold of his northern climate if he did not feed largely on oleaginous articles of food; hence, what may, by those living in a temperate zone, be considered a vitiated taste, is precisely in accordance with the real wants of their bodies, and without such kind of nourishment an existence in those latitudes would be insupportable: therefore all those animals upon which they live afford an abundant supply of the fuel upon which the flame of life is kept alive. The peaceful Hindoo can live in positive health on a far less heat-giving aliment, because the climate supplies the body with much of that warmth which in arctic regions it is obliged to generate within itself from a continuous chemical combustion. There is a caste of Brahmins who have not eaten flesh or wine from the beginning of the world,* which would have rendered extinct a northern tribe; yet they live in health, and are a fine people. In infants there is a considerable supply of fat, exactly in accordance with those laws which have been described above, relative to the inhabitants of cold regions. The respiratory and circulatory functions in the young are carried on with far more frequency than at an adult age; hence the processes of decay and renovation will be relatively greater, and especially the latter, which by exceeding the former gives rise to *growth* or increase of volume. The particles given off by a quick circulation are carried in abundance to the site of assimilation of the tissues, and, as they are not proportional to their generation, drawn off as waste by the effete excretaries, and transformed into various tissues. This supply of fat to the young is in a great measure deposited in the subcutaneous cellular tissue, where it cannot possibly interfere with the natural performance of the vital organs, nor encumber the visceral cavities; and as the internal parts of the young, during that state

* Herder's Philosophy of Man, Vol. I. p. 343.

of inaction incident to their inability for exertion, might have been deleteriously affected by a low external temperature, the subcutaneous interposition of adipose matter is highly calculated to avert the evil consequences which might otherwise have followed. When infants are morbidly fat, the depositions formed in a normal quantity in various parts are of course succeeded by similar phenomena to those witnessed in adults: there may be mechanical obstruction given to the respiratory and circulating apparatus, and it has been said that there is torpidity of the bowels. The child Fields could not undergo even moderate exercise without accelerating the breathing; and the somnolent tendency was so constant, that whenever left in a state of quietude he fell over into a slumber.

Females are decidedly more predisposed to the obese condition than males. When, either from the time of life or other cause, the irritation of the genital organs is not present, the liability to fatness is much more favoured; and most of the cases of obesity which we find recorded have been in early life, or at that age when the desire for their exercise has considerably abated. On referring to the autopsy of the female given below in this paper, it will be seen that the uterus and ovaries were, even in so large a person, smaller than natural. After the meridian of life, the impulses of the passions operate with less power, and there is then an increasing partiality for less corporal exertions, whilst, perhaps, there is a stronger relish for the indulgences of the table. On examination of the histories of these cases, it will generally be found that other branches of the family have been more or less inclined to polysarca; or, in other words, that they are predisposed to it by an hereditary tendency, which, as it has been seen, was the fact in the instance of the child Fields. Dr. C. J. B. Williams, in his article on this disease in the Cyclopaedia of Practical Medicine, speaks of sthenic and asthenic obesity; the former of which that writer asserts is characterised in persons who have unimpaired constitutions, live on a full and highly nutritious diet,—with whom the secretions are normally eliminated, the circulating function carried on with energy, and the blood-vessels well filled

with a healthy fluid, and where the corpulence first becomes developed rather as an excess of health than as the primary condition of disease. The latter, says that writer, "is commonly allied with a leuco-phlegmatic temperament, a soft languid pulse, defective excretions, and a low irritability of body. There is in such individuals a sufficient activity of the first part of the digestive process; but a somnolent disposition, often present for some hours after meals, indicates the admixture of chyle in the circulation, and a tardiness in its assimilation. The chyle thus supplied probably abounds more in fatty particles than in albuminous globules: until, therefore, the former are deposited from the circulating mass in the adipose membrane, the blood does not recover its natural and most healthy constitution." It has already been mentioned, when citing the experimental investigations of M. Chossat, how the fat of the body is more liable to absorption than any other tissue, and that, indeed, the blood can, during inanition, for some time be so renovated by its absorption from this substance, as to be supplied with a certain degree of stimulus necessary for the carrying on of the vital functions. It is, too, in this manner explicable why great bodily exertion is inimical to corpulence: the waste exceeds the amount of renovating materials supplied by the ingesta; hence, increased activity of absorptive function, and the further demand which there is upon the nutritive properties of the blood, is made up by the absorbents falling back upon the fatty tissue. Now, if in the leuco-phlegmatic temperament there should, from some cause, be a diminished degree of absorptive power, together with the co-existence of other and acknowledged conditions that favour the above deposition,—as corporeal inactivity, a sluggish nervous system, defective action of the sudoriparous and renal organs, and a diet possessing considerable amount of carbonaceous and hydrogenous principles, it may readily be supposed that the blood would then eliminate a less quantity of fat globules from the circulation than ought to be given off; and that these globules would, in the assimilation of the tissues, be of course deposited by the adipose tissue. In some

individuals in whom the circulatory function is carried on with great activity; where the vessels are large, filled, as it were, to plenitude; and when the blood is drawn presents all those conditions commonly known as characterising *rich* blood, as in a person of bilious temperament; yet such individual, with these peculiarities, with a blood abounding preternaturally with fat vesicles, may have at the same time rather an inclination to leanness than corpulency. In an instance of this kind there would be an increase instead of a diminution of absorptive power, whereby the fatty particles and other nutritious materials of the blood would in too great a degree be taken up into the circulation, and in a normal amount carried away from the seat of the assimilative process, to the various excretory organs of the body, especially to the liver, which viscus, from this excess of action imposed upon it, is prone to become ultimately obstructed and permanently torpid. In the sthenic form of obesity, which has been termed an "overflowing of health," of course the hepatic viscus, like all other organs, partakes of that hypertrophic proclivity which the system has generally acquired. Whatever may be the rationale as explicable of enlargement of the liver in polysarcous subjects, it is undeniable that it is generally found in the autopsies of such, of preternatural volume. It is true that as the disease advances there are conditions highly favouring its congestion,—as mechanical obstruction, torpidity of the bowels, considerable appetite, a sedentary mode of life, sluggishness of the mental faculties, and, perhaps, very generally more or less of renal disorder.

There has been amongst pathologists considerable diversity of opinion relative to the real manner in which fat is formed; some contending for its being deposited in the filamentous texture; others that there is a tissue proper for its formation; and one writer imagined fat to be a solid, constituted by the *juxta*-position of granular particles, without any investing or interposed membrane: an opinion which microscopical observers have decided as erroneous. Fat vesicles are spherical or spheroidal, or sometimes, when dependent upon pressure, assume polyhedral figures. Dr. William Hunter gave it as

his belief that there was a distinct adipose tissue, to which way of thinking Bichat, Beclard, and others, subscribed; whilst Majendie, Haller, and certain other eminent authorities, considered fat merely as deposition in the cellular structure. Dr. Williams considers the Hunterian doctrine on this point most tenable, and indeed such seems now to be most generally admitted. Wherever there is the greatest abundance of cellular tissue, there we find the largest quantities of fat, and by far the most in the subcutaneous, in the interstices of the muscles, and those other localities favourable to its formation, which have been mentioned above. It has been satisfactorily shown that fat vesicles *do* exist in the blood immediately before it passes from the thoracic duct into the general circulation; and as it is so generally and easily discovered in the blood, "it is probably partly received with the food," says a writer on this subject, "and partly formed by the process of secretion." If it be true, then, that fat-cells are transferred into the circulation from the *ingesta*, and that such cells are physically adapted for the process of assimilation, we can at once easily perceive why it is that fatty aliments so abundantly produce fat, as remarked of the Greenlander and the Esquimaux. It appears on certain accounts probable that such is more dependent upon the requisite elementary principles being supplied, from which the adipose secretions could with more facility be carried on than when the elaboration is from matters less assimilated in their constituents than in oleaginous compounds. The substance contained in fat vesicles consists of stearine, margarine, and oleine, the two first of which, when separated from the latter, maintain a formative shape of solid character, the latter remaining even at low temperature in fluidity. Each of these substances forms considerable proportions of carbon and hydrogen; therefore such food having an abundance of these elements will of course predispose to the generation of fat, such as various non-azotised compounds; that used as diet, the saccharine, amylaceous, oleaginous substances. Experiments made in the feeding of the lower animals have proved how the addition of sugar to their food favours the feeding process. For each sugar, the following is the

formula:— $C^{12}H^9O^9$; starch, $C^{12}H^9O^9$; here are then those indispensable elements in the formation of fat. Starch and sugar are the great sources from which fat is produced. Now if we have to abstract from starch $C^{12}H^{10}O^{10}$, 9 atoms of oxygen fat would be the result, as the latter is a formula for the substance. From this and other facts of a like nature, which might be given, it is incontrovertible that fat is produced by a deoxidating process on non-azotised materials. "Liebig has pointed out," says Turner,* that "when there is a deficient supply of oxygen, the production of fat, which is the consequence of this deficiency, yields a supply of that element, and thus seems to keep up the animal heat and the vital functions. * * * "A goose tied up, and fed with farinaceous food altogether destitute of fat, acquires in a short time an increase of weight of several pounds, the whole of which is fat. "Again, the bee produces wax, a species of fat, from pure sugar." The negroes of the West Indies, and the Chinese slaves, sometimes acquire an enormous size during the sugar season, by drinking the cane juice; and it was remarked by Galen, that the keepers of vineyards, who live on nothing but figs and grapes, become fat. The ladies of Tunis and Tripoli are fattened, to please their lords, with farinaceous food, and a seed called *drough*. Among the Asiatics there is a sect who pride themselves on their extreme corpulence: their diet consists of farinaceous vegetables, milk, sugar, sweetmeats, and ghee. They look upon corpulence as a proof of opulence; and many arrive at a great degree of obesity without tasting anything that has ever lived!† Numerous instances might here be supplied where great drinkers of malt liquors have attained to extreme degrees of corpulence. It is the opinion of some, that a century ago, fat people were then far more common than in these days, when the yeomanry and middle classes drank deep potations of malt liquors, instead of ardent spirits. The elementary constituents of ardent spirits being alcohol, and an abundance of carbon entering into the formation of that compound, there is thus supplied an important material for the

generation of fat; and was it not for the stimulation which alcoholic liquors give to the circulating function, and the increased action of the kidneys, which thus oppose the obese tendency, all descriptions of spirituous compounds would render dram drinkers more liable to corpulence. Those persons who are great gin drinkers, are, from the diuretic properties of that spirit, less prone to become fat than those who are great rum drinkers; a fact which the vulgar have long ago observed, and which has amongst the lower orders passed into a truism. From what has been said above, it must be regarded that fat is secreted by a peculiar tissue, the adipose; and to this view most modern physiologists subscribe. Dr. Hassell, in a recent number of the *Laneet*, thus delivers himself relative to the fat formation. "It will be observed by the use of a lens only, that these masses (the fatty) are each composed of a number of distinct and opaque bodies of various sizes, presenting a smooth outline, having a more or less rounded or oval form, and held loosely together by fibro-cellular tissue, the extension of which forms the envelope that invests each of these bodies; it will also be further noticed, that each mass of fat is supplied with one or more bloodvessels, and that these break up into numerous lesser branches, one of which goes to each of the previously described bodies, being conveyed to it by the connecting fibrous tissue, and having reached the body it undergoes a further subdivision, the branches extending over its entire surface." The writer then proceeds to say that the vesicles are filled with cells, and these cells again with globules; that these globules go on becoming larger in size until they assume the normal characteristics of the matured fat vesicles. From these observations it is obvious there is a greater secerne process; that there is a filamentous investment covering each vesicle; and that the fat particles are not merely placed in juxtaposition, as contended for by Meckel; and it may be inferred that the granules are produced from the blood by an exosmosial process at the capillary extremities, like unto what we know of similar functions in the formation of other tissues in animals as well as in the vegetable kingdom.

I shall now proceed to detail the

* Turner's Chemistry, p. 1220.

† Cyclop. Pract. Med. vol. iii. p. 192.

particulars of a case of obesity, occurring in the practice of Dr. Browning Smith, which, from the enormous size that the patient acquired, the history of the disease, the persisting progress of the complaint despite of all remedial measures, together with other points of interest, must needs be considered as a remarkable example of the polysarcal affection:—Mrs. G., forty-one years of age, the wife of a green-grocer, of light complexion. Had not borne any children, but had a miscarriage soon after she was married,—nearly twenty-three years ago. At the age of eighteen she was very thin and delicate. In the course of a few years subsequent to that time she became considerably stouter, had more colour, and was of better health. Eight years ago this corpulency more rapidly increased, and continued to do so up to the time of Dr. Smith's first attendance. For several years back she had eat and drank to a considerable extent, and on inquiries being instituted it was ascertained, that throughout the day she, at short intervals, took some description of food or malt liquor. Though she never drank spirits to intoxication, she indulged in regular and frequent potations of gin. Latterly she took but little exercise, and seldom felt inclined for any active exertion: was of placid and kind disposition, and rarely allowed any circumstance to ruffle her mind; slept soundly, and often during the day would fall over into a transient slumber. Dr. Smith attended Mrs. G. in occasional illnesses during the last three years, and in the two first attacks of indisposition she was confined to her room. In these affections the symptoms of which she most complained were difficulty and shortness of breathing; of some pain over right hypochondriac region; great tendency to somnolency also existed, and there was a positive aversion to any active exercise. Catamenia were then abundant. Continued doses of saline aperients, a low diet, with the interdiction of fermented liquors, were in the course of a few weeks succeeded by manifest relief. In January, 1848, she again became ill, and her medical attendant was called in. Five weeks after this Dr. Smith requested me to see her along with him. At our visit she was raised in the semi-erect position, and on entering the room I was forcibly struck with the patient's enormous

size; indeed, to such a magnitude had she attained, that it was no extravagant assertion to say, that she almost occupied three-fourths of a moderately sized bed. The mammae had become so exceedingly large, as in a pendant manner to hang down the thorax, whilst the interior part of the cheeks, the throat, and about the submaxillary region, was so grown up and distorted with fat, as to have obliterated the natural configuration. The abdomen was of immense size, and hung over the anterior part of the thigh to a very considerable extent; the interior extremities were shapeless masses, resembling in magnitude that œdematos condition met with in anasarcal dropsy. It may here be mentioned, that from Dr. Smith's first attendance the tegumentary covering on inferior part of abdomen felt rough and indurated, imparting to the fingers a horny or scaly sensation. On inspection, an erythematic blush co-existed, which in some parts had gone on to the vesicular eruption; and in the sulci formed by the flexures a serous exudation was manifest. Dr. Smith said this erythematic affection was very persistent, and although it was at various times considerably diminished under the different local applications which he employed, yet he never could by any means, topical or general, entirely disperse it. The breathing was difficult and laborious, and she had a wheezing cough; her voice was unnatural, and when she spoke it reminded the hearer of any one speaking who had tonsillitis, or as if a ligature being placed round the throat, the patient's larynx were compressed. There was a peculiar, sleepy, listless expression about the eyes, and the nurse reported, that when left alone she invariably passed into slumber. Pulse was full and strong, but from the interposed subcutaneous deposition of fat, unless the wrist were pressed rather strongly by the index finger, the pulse felt less forcible than it really was. Catamenia had some time ago ceased; the excretory evacuations were carried on pretty normally; the tongue indicated no fever, nor gave evidence of any gastric irritation. A constant employment of salines and diuretics was continued, and the requisite injunctions respecting a low and un nutritious diet. From this time (Feb.) until May, she continued much the same, progressively becoming larger, the breath-

ing more difficult, and the somnolency more irresistible,—indeed it was evident the case was verging into one of hopeless character. Salines, nitrate of potash, elaterium, alterative doses of mercury, Dr. Smith had persisted in, but to no avail. On 27th May, Dr. Bright was called in, and I saw her in consultation with that gentleman and Dr. Smith. Dr. Bright suspected disease of the kidneys, and on testing the urine there was a slight quantity of albumen discoverable, which was, however, but slight. The abdomen was then measured, and around the umbilicus it was seventy-two inches. Dr. Bright stated, that in one or two instances of this affection he had been of opinion that the preparations of iodine were of service, and especially the hydriodate of potash; consequently it was directed that the drug in question be tried, and she was ordered two grains of hydriodate of potash, with half a drachm of the tincture of hyoscyamus, in cinnamon water, to form a draught, three times a day. That medicine was persisted in for some time, but apparently without producing the least effect. She gradually became worse, increased in size, somnolency more persistent: at length the breathing alarmingly difficult; the countenance looked livid and congested; and, lapsing into a lethargic condition, she died, with the symptoms of complete coma, on the morning of July 1st.

Sectio cadaveris, 12 hours after death. — Cutaneous surface in some parts livid, especially at flexures of inferior extremities. On raising up pendant abdomen much lividity was apparent, particularly at mons veneris and about the labia; it also extended to abdominal parietes. On those parts there was a sero-purulent secretion. Face congested, and from nares freely distilled a frothy brownish fluid. The following are accurate admeasurements of various parts:—

	Inches.
From nipple to nipple	14
Girth of chest to immediately below axillæ	56
„ abdomen, passing over umbilicus	77
„ upper arm	17 $\frac{1}{2}$
„ ankle	15
„ calf of leg	21
„ middle portion of thigh	28
„ round upper portion of thigh . .	43
Depth of body as laid on back . . .	23 $\frac{1}{2}$

Carrying down an incision in the ordinary manner at the mesial line, from upper third of sternum to pubis, the subcutaneous stratum of fat over sternum was four inches deep! and midway between umbilicus and pubis it was no less than eight inches thick! The section presented a surface of coarse fat, and on minute examination small ramified vascular branches accompanied the filamentous tissue, which had assumed a thick and resistive texture. Removing the sternum, the lungs were somewhat mottled of the light grey colour which characterises emphysema. Both were throughout agglutinated to the pleura costalis, which soft, easily-lacerable bonds of union readily gave way, as the hand, edgewise, was slid up between these organs and the thoracic walls; and the resistance was scarcely so much as that which attains where deposition of lymph is very recent. On examining portions of this interposed matter we were at once satisfied of it, it consisting of scarcely anything but fat. The pulmonary organs were larger than natural, but with such increase of volume, and the previously mentioned emphysematous appearance anteriorly, no other pathological conditions were apparent. Opening the pericardium, three or four drachms of straw-coloured serum escaped. Heart considerably larger than normal, weighing (exactly as it was removed,) 1 lb. 12 oz.* The right ventricle was well-nigh covered with a coat of fat varying from one to three lines in thickness, and which, on being torn off, indefinably blended with the muscular tissue,—that is, by the transition of the muscular fibres, first into a pale opaque substance, then insensibly passing on to veritable fat.† Walls of all the cavities were hypertrophied, those of the right ventricle being four lines in thickness, and in the left measured nine lines. Edges of valves felt soft and fatty, and corpora arantii, both at semilunar and pulmonary, were more

* The organ was then freed of coagula by washing, and on again being put into the scale it weighed 1 lb. 10 oz.

† A member of the Society, Dr. Seaton, expressed his regret that a portion of the muscular fibres degenerating into another tissue had not been microscopically examined. It would certainly have been of some interest; but in examining portions without the aid of a lens, it was discernible that the substance was deposited chiefly amongst the little filamentous investments of the muscular fasciculi.

tuberculated than normal; and on the point of a scalpel being applied, the increase of these bodies was caused by the deposition of fatty matter, and it easily broke down between the fingers, being of far softer consistence than the vegetations sometimes met with at the apices of these organs. Exposing the abdominal viscera, which, however, could only be imperfectly done, notwithstanding the mesial incision having been carried down quite to the pubis, from the enormous thickness of the parietes, the organs were completely agglutinated by (lost in) huge masses of fat. The omentum was of enormous size, and from it proceeded prolongations of pure fat, thick as a moderately sized candle, from one to four inches in length: the appendices epiploicæ had become so morbidly large and expanded as to almost cover the large intestine. Liver was by the same substance adherent to concave surface of diaphragm, weighed 7 lb. 6 oz., was of a pale yellow brown, and sections showed its parenchymatous structure to have degenerated into that pathological condition known as the nutmeg character. Spleen was greatly enlarged, weighing 1 lb. 7 oz., and on being cut the surfaces showed its colour to be preternaturally dark; it was assuming the jammy consistence, and a semifluid matter followed the knife, a good deal resembling what is observed in autopsies when the patient has died from fever distinguished by intermittent symptoms. Right kidney encased in a nidus of bright yellow fat, which covering alone weighed 13 oz., and the kidney itself 12 oz. On longitudinally dividing the organ, disease of the cortical substance was abundantly manifested, the granular degeneration being most complete, and descending deepest into the medullary structure in its central portion. The same description applies to the left, only the *morbus Brightii* attained to a greater extent. Uterus and ovaries exceedingly small; the former felt hard and cartilaginous; its cavity was contracted.

The details of the previous case are quite in accordance with what we know of the general characteristics of the disease. The gradual and uncontrollable mode of its supervention; the utter uselessness of remedies; the symptoms of somnolency, and em-

barrassment of the respiratory organs; the tranquil, inert disposition; the manner in which the fatal termination ensued, with other traits,—are similar to two other instances of obesity that went on to the destruction of life. In a majority of not less than three-fourths of those who die of this affection, the patients are of sanguino-phlegmatic temperament; and if any one will refer to the various evidences given corroborative of this assertion, it will be found as the case; and in those who have not an extreme tendency to the corpulent condition, the same holds good. What has already been advanced respecting the nervous system and the secretion of bile in those of the bilious temperament, with reference to the fatty tissue and its formation in the system, is explicable of this proneness of sanguino-phlegmatic to assume the obese condition. It has been stated, that Mrs. G— took considerable quantities of food, but yet when placed upon an un-nutritious diet the polysarca went on. A like circumstance, with regard to this point, I well remember occurring during the time I was house-physician in the Edinburgh Royal Infirmary. The patient was a female, about 40 years of age, of short stature, and so obese as from the first to make her case considered one of alarming character. The features were grown up with fat; the eyes looked small and sunken, from the cellular deposition of this substance around the foramina. Even walking up and down the ward was attended with difficulty, and the exertion gave rise to further embarrassment of breathing, which was in a quiescent state hurried, short, and laborious. When she spoke, there was the same thick, quinsy-like enunciation as observed in Mrs. G—. The appetite was preternaturally large; somnolency so persistent, that whenever left but a few minutes to herself, she dozed over into slumber. There was a torpor of mind, an aversion to all exercise, a listless apathetic state, which so characterise this curious disease. She was ordered a diet not more nourishing than allowed to the fever patients, consisting chiefly of panado and slops, yet the polysarca progressed, and after being some time an inmate in the hospital she died, with comatose symp-

toms.* The autopsy much resembled that of Mrs. G—, but in considerably less degree. As I did not, however, preserve any notes of the post-mortem appearances, I cannot particularize the morbid conditions.

Another instance I may here mention of a lady who arrived at adult age and then became remarkably stout. She was of fair complexion, and had borne no family. Exercise, partial starving, and every probable expedient, were had recourse to, yet without any amelioration. The malady was not to be arrested, and she, too, died in a lethargic condition. The breathing was laborious; somnolency during the close of her life so urgent that, unless constantly conversed with, or by some such means kept awake, she would drop over into sleep. This invariable symptom of somnolency of course results from mechanical vascular obstruction, which the depositions of fat along the course of the vessels, especially in the neck, produce. The venous blood flows tardily through the sinuses, which, becoming distended, create more extensive encephalic congestion: hence that inanimate expression of the eyes, the clouded intellect, and irresistible drowsiness. Although the head was not opened in the section of Mrs. G—, from the manner in which death took place, the emaciated symptoms terminating the illness, it is highly probable the cerebral cavities were distended with serous fluid. The erythematic redness on inferior surfaces of abdominal parieties was the result of capillary congestion produced by gravity, and the sero-purulent condition of the skin at the flexures could not otherwise than ensue from the friction and constant pressure to which it was subjected: hence the failure of all applications where a cause so existant could not be removed. The enormous dimensions must needs have been considered surprising. The patient died early in the morning; and although the body was not opened until twelve hours subsequently, the viscera were quite warm, and in the larger vessels the blood had, after so long a time subsequent to dissolution, in a great measure retained its fluidity.

Dr. Bright said the greatest girth of any patient he had ever known was 72 inches: in this it was 77! On making the longitudinal incision, the knife was followed by a considerable quantity of clear, straw-coloured, oleaginous fluid, and which, on minute inspection, trickled down from the fatty surface for some time after the section had been made. Dr. Smith particularly directed my attention to the light fawnish-red colour of the muscular tissue, and to the extreme coarseness of its texture; also the unnatural flabbiness of that tissue. All writers on obesity have noticed the paleness and softened condition of the muscles. It is owing to this change that their contractile power is diminished, and why very fat persons are not strong in proportion to their entire volume: again, in some measure to the same cause is attributable why the obese ever complain of shortness of breathing and palpitation. Those who have written treatises on diseases of the heart, have noticed that its fatty degeneration is sure to give rise to dilatation of its cavities, resulting from diminution of muscular tonicity. When the muscular fibrillæ morbidly assume the fatty change, impediment must be given to their functions, not only by increase of volume preventing their perfect apposition and co-operation, but from their less resistive power, and to the obstruction such gives to the proper capillary influx of their normal and only stimulus (Le Gallois, Wilson Philip, and others)—arterial blood. Therefore, such resistive power being diminished, longitudinal extension results: hence is a cause of parietal dilatation of this organ, and in an exact ratio with the sum of such dilatation, is a greater in-pouring of blood into the cavities, and the subsequent increase of organic power required to efficiently and continuously empty the cavities, and propel the enlarged volume of blood into the great vessels; therefore it is incontrovertible that loss of muscular contractile tone in hollow organs from this, as any other cause, must be succeeded by cavitated expansion. There is another way giving rise to similar pathological results that may here be incidentally mentioned: where muscular fibrillæ themselves are not the prime causation by morbid conversion into

* In these cases the system no doubt absorbs, in a morbid manner, hydrogen from the atmosphere.

another, and a normal substance, as in the adipose degeneration. This is by a loss of nervous influence, when the lesion is primarily located in one of the nervous systems—especially in the motor, properly so called, which is well illustrated in instances of paralysis, where the bladder becomes preternaturally distended; in chronic atony of the uterus; and, according to Abercrombie, in ileus, which that philosophic physician contended was the prime cause of obstruction in the case of ileus. In the examination of this organ, in the above inspection, when it was laid on the table, by its softened condition, its formative consistence was so far lost, that it collapsed upon itself, and assumed a placental-shaped mass. Respecting the hypertrophied state of the walls, their thickening was to be anticipated, not only because there was a general hypertrophy of all the tissues, but also on physiological grounds, because, wherever there is a gradual demand for increased functional action in an organ or organs, enlargement of structure is commensurately necessary, in order to meet that demand resulting from excess of action in such organ or organs; and, of all other tissues, this more particularly applies to the muscular. Sometimes in obese subjects the heart has lacerated,—a circumstance noticed by Dr. Williams, who cites an example of the kind from M. Bertin, and relates the fact of the late Dr. Higgins, of Dublin, the discoverer of equivalents in chemistry, who died from this cause. "We have seen the heart," says the author of the article on this disease in the Cyclopædia of Practical Medicine—"we have seen the heart more than half covered with fat; the adipose tissue of the base and surface having encroached on the muscular fibres, so that at the base and along a greater part of the wall of the right ventricle, and at the septum of the ventricles, these fibres only formed a thin stratum irregularly terminating in the adipose tissue. Laennec describes this state of the heart, and says that the fatter the heart is, the thinner in general are its walls; and, on cutting into them, the scalpel seems to reach the cavity without encountering almost any muscular substance, the columnæ carneæ appearing merely as if bound together by the internal lining membrane." The organ in this case was

not thinner in the manner described by Laennec; yet still, from having acquired such large dimensions, and the muscles pale and flabby, the additional power required to expel the large volume of blood contained in its ventricles, such an event as rupture might not have been an improbable result. The liver, we see, was from one-third to one-half larger than normal, and its substance had assumed that light fatty complexion, which is familiar to the morbid anatomist, as being met with not merely in cases of obesity, but in instances when that organ is the chief lesion. I have often seen the same change in the parenchymatous structure of this organ, in autopsies made in the pathological theatre of the Edinburgh hospitals, and in most of these instances, such was in the bodies of confirmed dram-drinkers. The appearance of the spleen, its considerable congestion, the semi-diffuse consistency and other pathological conditions might have been expected where there was enlargement of the hepatic viscus; and, although it has been my lot to make a considerable number of autopsies, yet in no instance do I remember congested liver, without congested spleen. All writers on splenitic affections have insisted upon the great sympathy which there is between these organs. The spleen may be much beyond its proper size, without almost attracting the notice of the practitioner during life; its mere congestion giving rise to no sympathetic disturbance. The granular degeneration of the kidneys had progressed to a decidedly greater change than might have been anticipated from the comparatively insignificant amount of albumen discovered in the urine; and I have often known far more functional disorder associated with less structural change. If fat be formed by a secretory process from the blood, and as we know that hydrogen is its chief elementary constituent, it follows when, from whatever cause, there is an abnormal increase of hydrogen in the body, that the preternatural accumulation of fat must be produced, because there are no emunctorial set of organs sufficiently active to carry it off in a due degree: unlike what is the case when carbon is too abundantly generated, when the lungs form an outlet; or where azote is too greatly formed, when increase of action

in the kidneys averts those evils that might otherwise aereue in the system. The three great exercent functions—viz. those carried on by the lungs, liver, and kidneys, undoubtedly are highly dependent upon the perfect action of each other in preserving a natural condition of the blood, that is a proper proportion of its constituents, so indispensable in the reparation of the tissues; and when there is excess or deficiency of one of the main elements entering into the formation of these (carbon, hydrogen, and azote), the balance of function in secretion is maintained by the other two; but with regard to hydrogen, it appears the deposition of fat relieves the blood of hydrogenous excess: thus, presuming upon disorder in these seerent actions, the kidneys might be inordinately exercised, and thus structural change the consequence, because whenever there is disorder in the circulatory function, the kidneys are of all other organs most likely to become in one way or other affected in such change. The small size of the uterus and ovaries is quite in accordance with what has already been advanced respecting the influence of the generative organs in the obese; that is, that their frequent exercise being, from the irritation produced in the system, opposed to the obese dia-thesis, that obesity is most likely to come on when sexual irritation is on the decline, and thus the removal of the testes and ovaria, by the repose which is given to the system, inclines to the deposition of fat.

From what has been advanced in this paper it is evident that these views incline to the humoral pathology,—a doctrine which is daily becoming more established; and if we are to regard the formation of inordinate deposition of fat, as I have humbly endeavoured to show by the foregoing statements, it is manifest that the lesion principally exists in the blood, and to redress the abnormal production of hydrogenous matter is the only rational mode of procedure.* It follows, then,

* In the discussion which ensued on reading this paper, one member of the Society observed, that as the true theory appeared to show, in these cases, excess of hydrogen was undoubtedly the fundamental cause, such suggested that it might be well to try the effect of causing oxygen gas to be given off in an apartment which would, of course, give rise to an increase of deoxidation in the system, and thus *consume* a greater quantity of hydrogen. Would chlorine produce any beneficial effect?

that a dietetic treatment is far more likely to be of service than any medicinal agents given with this primary view. Food in sparing quantity is eminently indicated, and to consist of those articles which are generally allowed as not being nutritious, such as slops, fish, biscuits, green vegetables, acidulated drunks, &c. Exercise should be particularly insisted upon, and taken in moderate but continuous degree; warm baths to keep in action the sudoriparous organs; the frequent use of saline aperients combined with mild diuretics; and in the florid, who are of high vascular temperament, small and repeated abstraction of blood is beneficial, but heroic venesection would not answer, as sudden depletion would endanger the supervention of anasarca. Dr. Bright recommended the hydriodate of potash, from a supposition that it gave a tone to the absorbents, and thus might tend to remove the deposition of fat. Alkaline preparations have long been recommended, such as aqua calcis, liq. potassæ, to neutralize the fat, and with this view soap was given by the older physicians. The decoction of guaiacum was employed by a Dr. Fleming nearly a century ago, and the same physician speaks of the advantageous use of vinegar. The manner in which a continuance of either acids or alkalies acts is doubtless in a great measure by disordering the digestive organs, and thus depriving the system of its proper supply of healthy chyle. The Egyptians had their ars pinguis faciendi and their ars attenuandi, the latter of which is supposed to have been promoted by acid preparations.

P.S. Incidentally speaking of this disease to a gentleman, some days ago, he related a case in point, and has favoured me with a brief outline of the particulars, which are given in the following letter:—

6, St. Ann's Terrace, St. John's Wood,
3d March, 1849.

MY DEAR SIR,—If the following case of obesity after amputation will be of service, I shall be most happy. Mr. B., a gentleman holding a very responsible situation in the War-office, of about 25 years old, about five feet eight inches, fair complexion, of active habits, slim made, had accepted an invitation to dine with some friends:

the evening turned out very wet when he joined them, but a severe frost succeeded, and on quitting the house he fell on the first step, and, as he said, hurt his right knee, but thought nothing of it for a few days, when he complained of pain on pressure; and a slight blush of inflammation was evident on the inside of the patella. I recommended leeches and fomentations, which he ridiculed, and insisted in using some common liniment: in a few days after this, His Royal Highness the late Duke of York noticed his lameness, and being a great favourite of his, sent for Sir Astley (then Mr.) Cooper, and requested him to give every attention to the case. Active treatment was then pursued, leeching, cold applications, blisters, perfect rest, and every means to reduce inflammation, and prevent periosteal deposit: the disease, however, progressed. He became thin and emaciated, and apprehensions were entertained of his becoming hectic, when amputation was decided on, and Sir Astley begged him to accept a private room at St. Thomas's, where the limb was removed by the circular incision: the recovery was most rapid, and in six weeks he was once more at the War-office. At the end of six months he had quite recovered the effect of his previous suffering, and that consequent on the operation. It then struck me he was much disposed to become fatter in his person; but knowing he was very moderate in his habits I had no fear as to the result, judging the want of his usual active habits had produced it; that he had reached the maximum, and with care and abstemiousness a proper standard of health would follow. This, I regret to say, was not the case: he increased in size, *I might say daily*; being aware of it, and having a great horror of becoming obese, he placed himself under the strictest regimen possible. His breakfast comprised a single slice of toasted bread (dry), and a small cup of tea; at one o'clock a glass of sherry, with *part of a biscuit*; his dinner, a

mutton-chop and a wine-glass of water, *no beer, no wine*, and using as much exercise as his loss of limb would permit. He continued with all this care and attention to increase in size and weight; and when I left England, in 1814, the obesity was most painful to look on. On my return, at the expiration of twenty years, so many changes had taken place, I could learn nothing of my friend; and the only conclusion I could come to was that he had died from its effects on the circulation. It was a melancholy case of a man dying, you might say, from excessive health. I fear this sketch will be of little use to you, but I have given it as far as recollection will serve; and should it tend to throw light on the treatment to be pursued in obviating so distressing a disease, I shall, indeed, be most happy.—I am, my dear sir,

Yours very truly,

H. A. HAWKINS.

To Dr. Wardell.

Mr. Hawkins said, when he gave me the above letter, that the case must have terminated fatally, as the obesity was so enormous when he last saw the patient that it could scarcely fail to produce death. It is rather remarkable that the corpulency should not manifest itself before the amputation. Had the imposed quietude previous to the operation developed the predisposition to the formation of fat, so that as soon as the system was freed from the irritative influence of the affected joint, the morbid action rapidly ensued? It is not unfrequent when a carious limb has been removed that the individual afterwards becomes exceedingly stout. In 1841, I assisted in removing the inferior extremity of a young man, who had caries of the knee joint, which had been of so long standing as eleven years. At the time of the operation he was so attenuated as to weigh not more than from seven to eight stones: in less than two years he weighed almost double that weight.

